

REMARKS

Applicant has carefully reviewed and considered the Final Office Action mailed on September 27, 2006, and the references cited therewith.

No claims are amended, claims 17-30 are withdrawn; as a result, claims 1-46 are now pending in this application.

Specification

Applicant thanks the Examiner for suggesting changes to the Abstract. Applicant has amended the Abstract as suggested in the Final Office Action dated September 27, 2006. In addition, Applicant has amended the specification at the paragraph beginning on page 20, line 16 to include the serial number and filing date of an identified co-pending application. No new matter has been added in the amendments to the specification. Applicant respectfully requests consideration and approval to enter the amendments to the specification.

§ 112 Rejection of the Claims

Claims 3, 15, and 46 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

For claims 3, 15, and 46, Applicant respectfully submits that independent claims 1, 14, and 39, from which these claims depend, provides that the channel includes one or more of a metal oxide of which at least one is of an amorphous form. As such, Applicant respectfully submits that metal oxides of other forms could be included with the at least one in the amorphous form recited in independent claims 1, 14, and 39. Applicant respectfully submits, claims 3, 15, and 46 provide for these embodiments.

As such, Applicant respectfully requests reconsideration and allowance of claims 3, 15, and 46 in view of the same.

§ 103 Rejection of the Claims

Claims 1-5, 14-16, 31, 32, 36-41, and 46 were rejected under 35 USC § 103(a) as being unpatentable over Cillessen, et al. (U.S. Patent No. 5,744,864) in view of Kingery, et al. (U.S. Patent No. 3,294,660).

Claims 1-9, and 31-33 were rejected under 35 USC § 103(a) as being unpatentable over Ohta, et al. ("Frontier of Transparent Oxide Semiconductors", Solid State Electronics, Vol. 47, No. 12 (Dec. 2003) pgs. 2261-2267) in view of Kingery, et al. (U.S. Patent No. 3,294,660).

Claims 39-43 and 46 were rejected under 35 USC § 103(a) as being unpatentable over Kawasaki, et al. (U.S. Patent No. 6,727,522) in view of Ohta, et al. ("Frontier of Transparent Oxide Semiconductors", Solid State Electronics, Vol. 47, No. 12 (Dec. 2003) pgs. 2261-2267) and Kingery, et al. (U.S. Patent No. 3,294,660).

Applicant respectfully traverses the rejections as discussed, at least in part, in the Applicant's response, filed on July 13, 2006, to the then outstanding Office Action. Additionally, Applicant traverses the rejections for the reasons which follow below.

As stated in Applicant's previous response, the Cillessen reference appears to describe, "The semiconductor material is a degenerate semiconductor material" that is "provided with dopant atoms". (Abstract). However, from Applicant's review of Cillessen, the reference does not appear to show a channel contacting a drain electrode and a source electrode, where the channel includes one or more of a metal oxide including zinc-gallium, cadmium-gallium, cadmium-indium, and where at least one metal oxide of the channel is of an amorphous form.

Likewise, neither the Ohta nor Kawasaki reference describe, teach or suggest "at least one metal oxide of the channel is of an amorphous form.

In contrast, Applicant's independent claim 1 recites:

a channel contacting the drain electrode and the source electrode, wherein the channel includes one or more of a metal oxide including zinc-gallium, cadmium-gallium, cadmium-indium, and wherein at least one metal oxide of the channel is of an amorphous form.

Independent claim 14, as amended, recites:

means for controlling current flow electrically coupled to the drain electrode and the source electrode, wherein the means for controlling current flow is comprised at least partially of a channel in an amorphous form;

Independent claim 31, as amended, recites:

depositing a channel including the precursor composition to form a multicomponent oxide from the precursor composition contacting the drain electrode and the source electrode, wherein the multicomponent oxide is of an amorphous form;

Independent claim 36, as amended, recites:

providing a semiconductor device that includes a source electrode, a drain electrode, and a channel to electrically couple the source electrode and the drain electrode, a gate electrode separated from the channel by a gate dielectric, wherein the channel includes a multicomponent oxide including at least one metal cation from group 12, and at least one metal cation from group 13, wherein group 12 cations includes Zn and Cd, and group 13 cations includes Ga and In, to form at least one of a three-component oxide, a four-component oxide, and a two-component oxide that includes zinc-gallium oxide, cadmium-gallium oxide, cadmium-indium oxide, wherein at least one of the two-, three-, and four-component oxides is formed of an amorphous form;

In addition, independent claim 39, as amended, recites:

a channel contacting the drain electrode and the source electrode, wherein the channel includes one or more of a metal oxide including zinc-gallium, cadmium-gallium, cadmium-indium, and wherein at least one metal oxide of the channel is of an amorphous form;

As such, Applicant respectfully submits that each and every element and limitation of independent claims 1, 14, 31, 36, and 39 is not present in the Cillessen, Ohta and Kawasaki references.

The Examiner notes on page 4 of the present office action that:

The difference between Cillessen and the claimed invention is the metal oxide is amorphous. Kingery discloses a semiconductor film made of an amorphous metal oxide (col. 4, lines 1-7). In view of such teaching, it would have been obvious to the ordinary artisan at the time the invention was made to modify the invention of Cillessen by using an amorphous

metal oxide (including zinc-gallium) for the purpose of allowing the film to be used in higher temperatures (see col. 1, lines 19-27 of Kingery).

Similarly, the Examiner notes on page 7 of the present office action that “the difference between the Ohta and the claimed invention is the metal oxide is amorphous”. On page 9 of the present office action the Examiner notes that “a further difference between Kawasaki and the claimed invention is the metal oxide is amorphous”.

The Applicant respectfully disagrees that it would have been obvious to have modified the Cillessen, Ohta, and/or Kawasaki references in view of Kingery at least for reasons that one of ordinary skill in the art would not have been motivated to look to the 1966 teaching contained in the Kingery reference as applicable to present semiconductor processing.

A careful reading of the Kingery reference illustrates that the reference describes “cool” temperature processing. Lines 5-7 of column 4 recite vapor deposition on a substrate which is “cool” with respect to the melting point of the particular oxide. The fact that lines 19-27 of column 1 in Kingery appear to describe that “semiconductors made in accordance with this invention are capable of use to higher temperatures than is possible with conventional crystalline semiconductors” has no bearing on the fact that Kingery is entirely a “cool” processing technique.

Cillessen, by contrast, appears entirely to describe a “high” temperature, pulsed laser deposition at a temperature of 650 degrees Celsius. (See, col. 5, lines 9-10, col. 6, lines 20-21, col. 8, lines 14-15, etc.).

Ohta, by contrast, appears entirely to describe growing single-crystalline films by reactive solid-phase epitaxy, e.g., a “high” temperature process. (See Abstract). And, Kawasaki, by contrast, appears entirely to describe a process for “doping” a channel which is inherently a “high” temperature process, e.g., plasma doping.

As such, Applicant respectfully submits that a current practitioner of ordinary skill in the art would not have looked to a non-analogous art, such as a low temperature processing approach, e.g., the 1966 Kingery low temperature approach for **single**

component amorphous element-oxide, for a teaching to amorphous “multi-component” amorphous element-oxides. Arguably, any such early reference would not seemingly have a relevance to the modern practitioner’s thoughts and approach for overcoming hurdles in present high temperature processing environments. Moreover, Applicant respectfully submits that, in addition the “cool” processing technique of Kingery, the Kingery reference does not begin to suggest that an amorphous technique in a “cool” processing environment could achieve the “multi-component” amorphous element oxides as achieved and claimed by the Applicant in the present disclosure. Respectfully, Applicant submits that the same would take under experimentation to achieve and that as such the reference does not support the present 103 rejection.

With regard to independent claim 31, Applicant once again respectfully submits that the Examiner apparently has taken Official Notice that the 1966 cool temperature process of Kingery for producing amorphous Zn-O is in effect enabling for teaching modern day high temperature processing of multi-element channel processing in amorphous form. The Examiner states that “if the product of a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 227 USPQ 964, 966.” Applicant respectfully submits that the Cillessen reference does not describe, teach, or suggest that a “multicomponent oxide is of an amorphous form”, the Ohta reference does not describe, teach, or suggest that a “multicomponent oxide is of an amorphous form”, and that Kawasaki does not describe, teach or suggest that a “multicomponent oxide is of an amorphous form”. Moreover, one of ordinary skill in the art is would not be motivated to reference the 1966 low temperature description for amorphous Zn-O in Kingery for solutions in modern multicomponent oxides in amorphous form. Hence, Applicant respectfully submits that product of a product-by-process of *In re Thorpe* is inapplicable to the present claims. The final product of independent claim 31, indeed, is not the same as a product of the prior art, in particular, that of Cillessen, Ohta, Kawasaki, and/or Kingery.

Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of independent claim 31, as amended, premised upon the *In re Thorpe* decision, as well as those claims that depend therefrom.

Applicant respectfully submits that each and every element and limitation of independent claims 1, 14, 31, 36, and 39 is not described, taught, or suggested in the Cillessen, Ohta, Kawasaki, and Kingery references. As such, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection for the above independent claims, as well as those which depend therefrom.

Allowable Subject Matter

Claims 10-13, 34, 35, 44, and 45 were objected to as being dependent upon a rejected base claims, but were indicated to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicant thanks the Examiner for indicating the above allowable subject matter.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney Gregg W. Wisdom at (360) 212-8052.

At any time during the pendency of this application, please charge any additional fees or credit overpayment to the Deposit Account No. 08-2025.

CERTIFICATE UNDER 37 CFR §1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: **MS AF** Commissioner for Patents, P.O. BOX 1450 Alexandria, VA 22313-1450, on this 27th day of November, 2006.

Sarah L. Reinhard
Name

Sarah L. Reinhard
Signature

Respectfully Submitted,
Randy L. Hoffman, et al.

By their Representatives,
BROOKS & CAMERON, PLLC
1221 Nicollet Avenue, Suite 500
Minneapolis, MN 55403

By: Edward J. Brooks III
Edward J. Brooks III
Reg. No. 40,925

Date: 11/27/2006